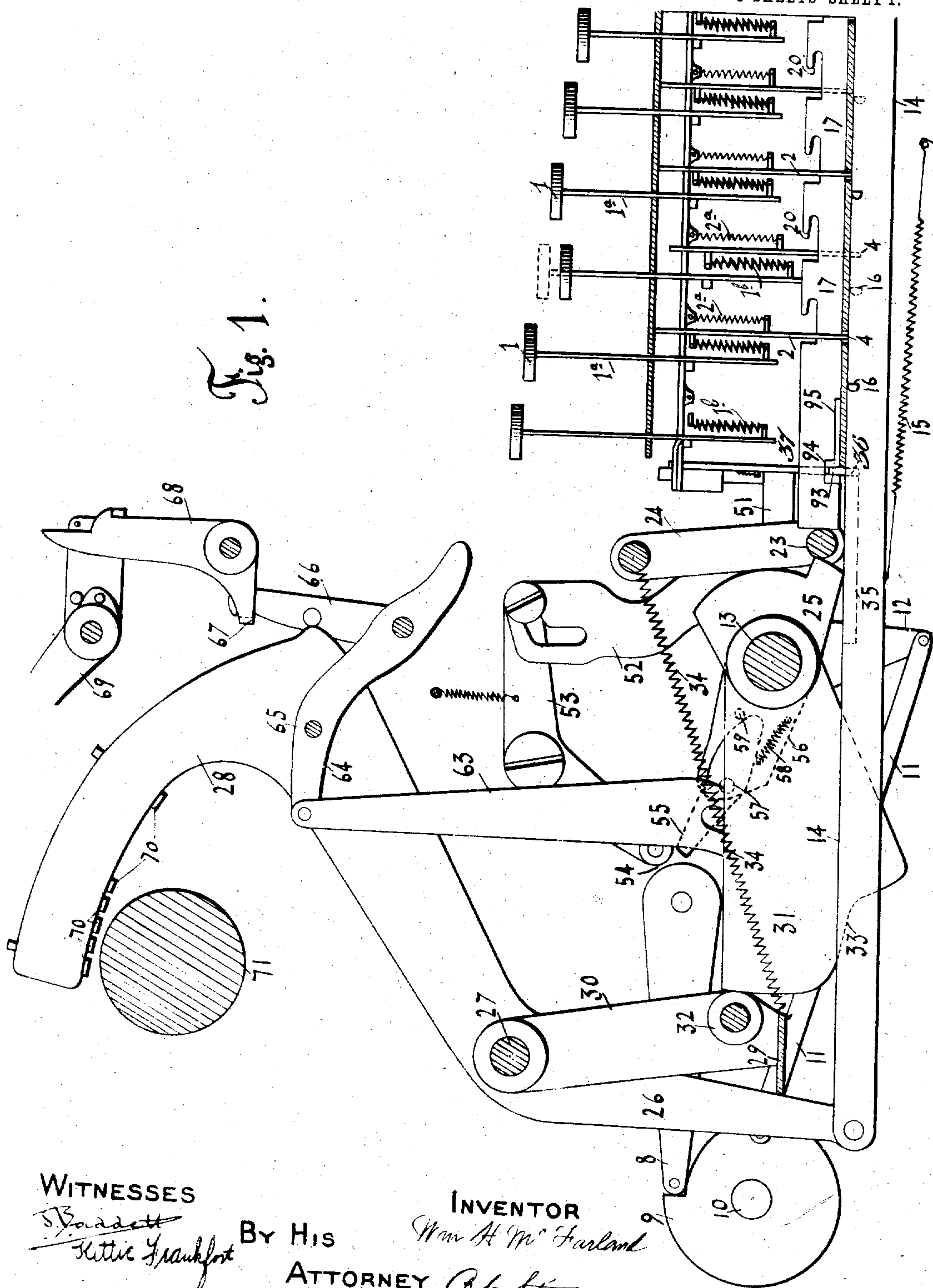


973,683.

W. H. McFARLAND.
COMPUTING AND RECORDING MACHINE.
APPLICATION FILED NOV. 21, 1905.

Patented Oct. 25, 1910.

5 SHEETS—SHEET 1.



WITNESSES

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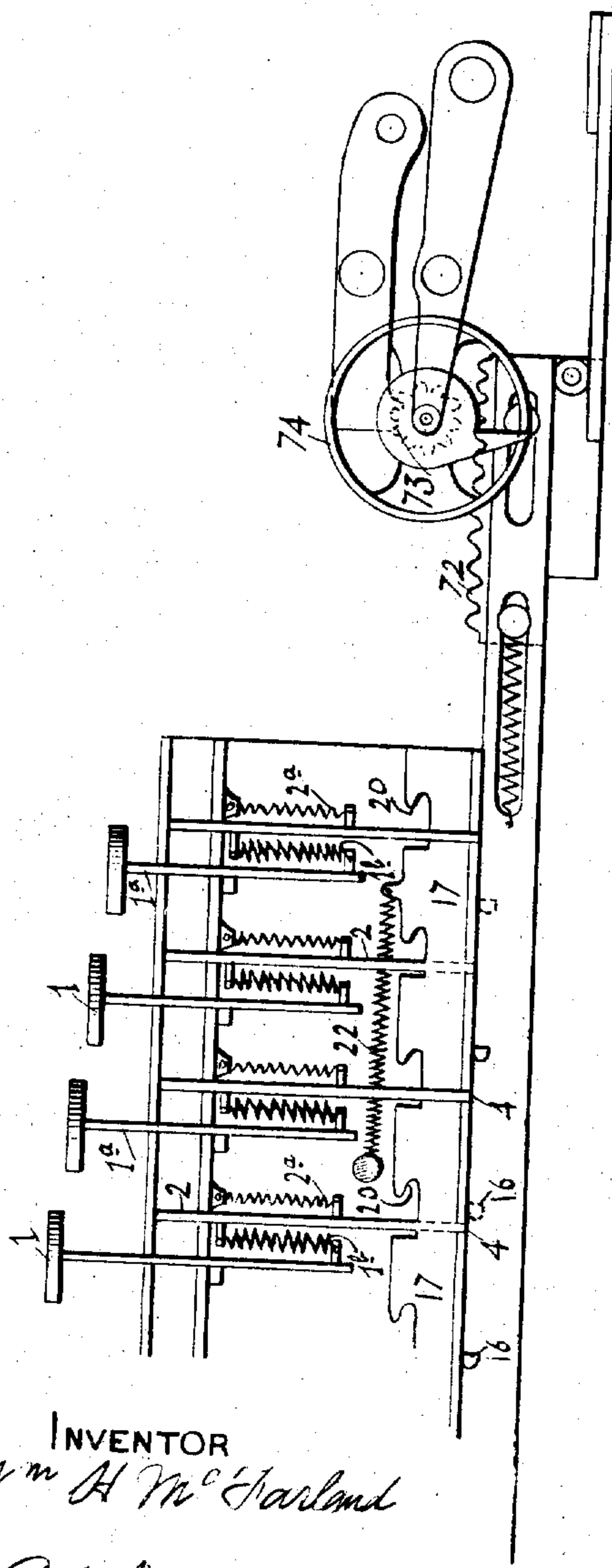
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5 SHEETS—SHEET 2.

Fig. 2.



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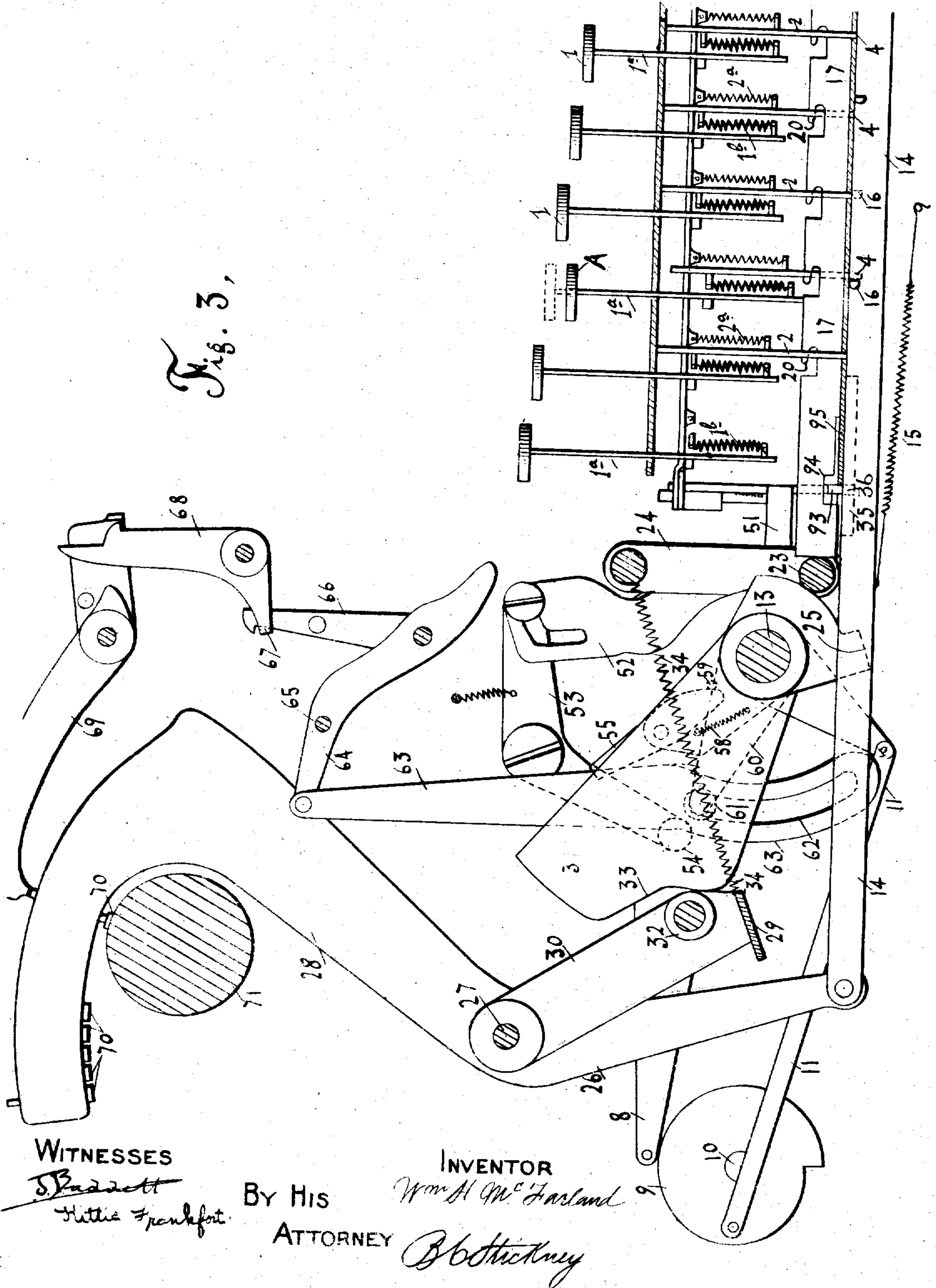
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5 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.

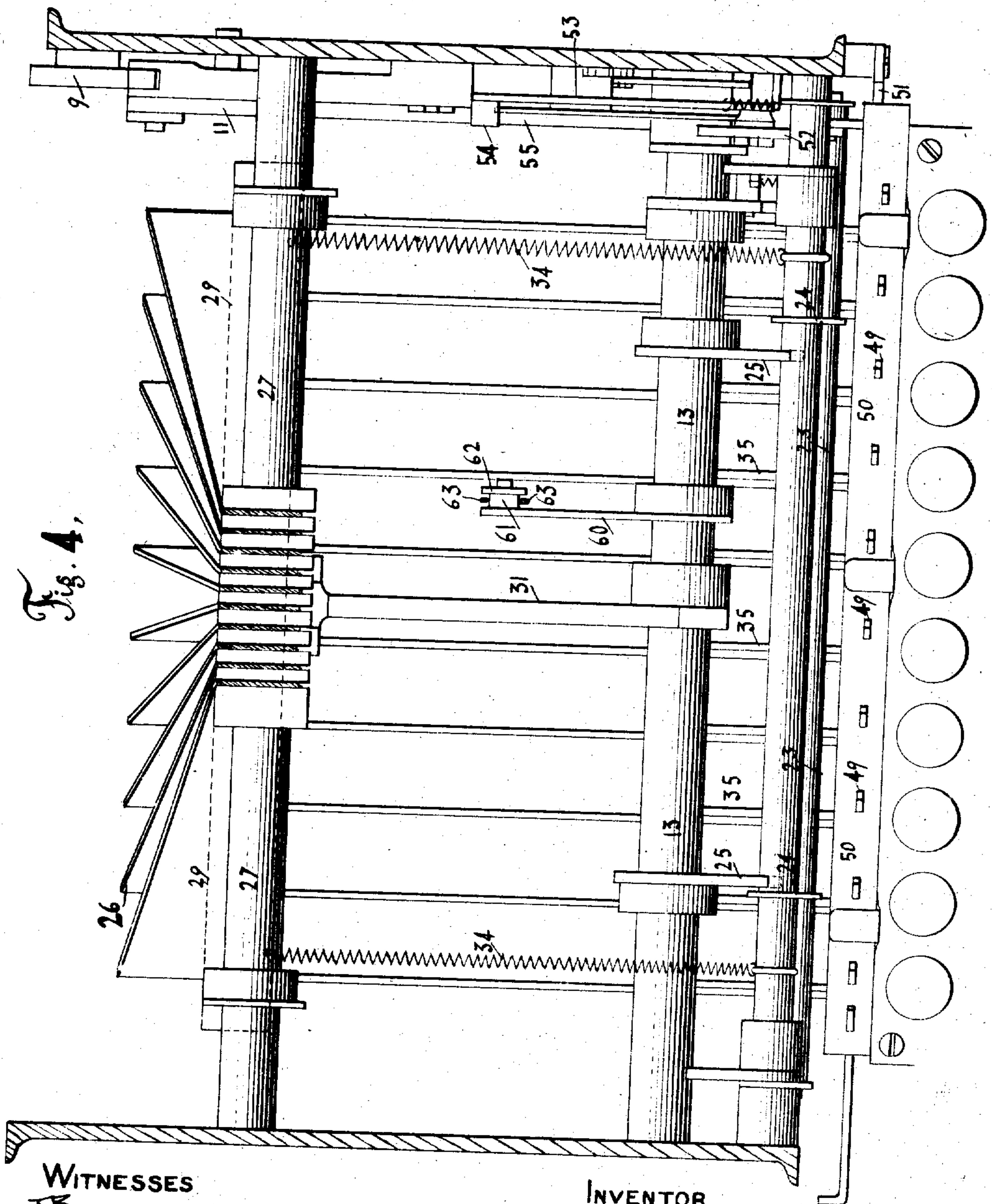


Fig. 4,

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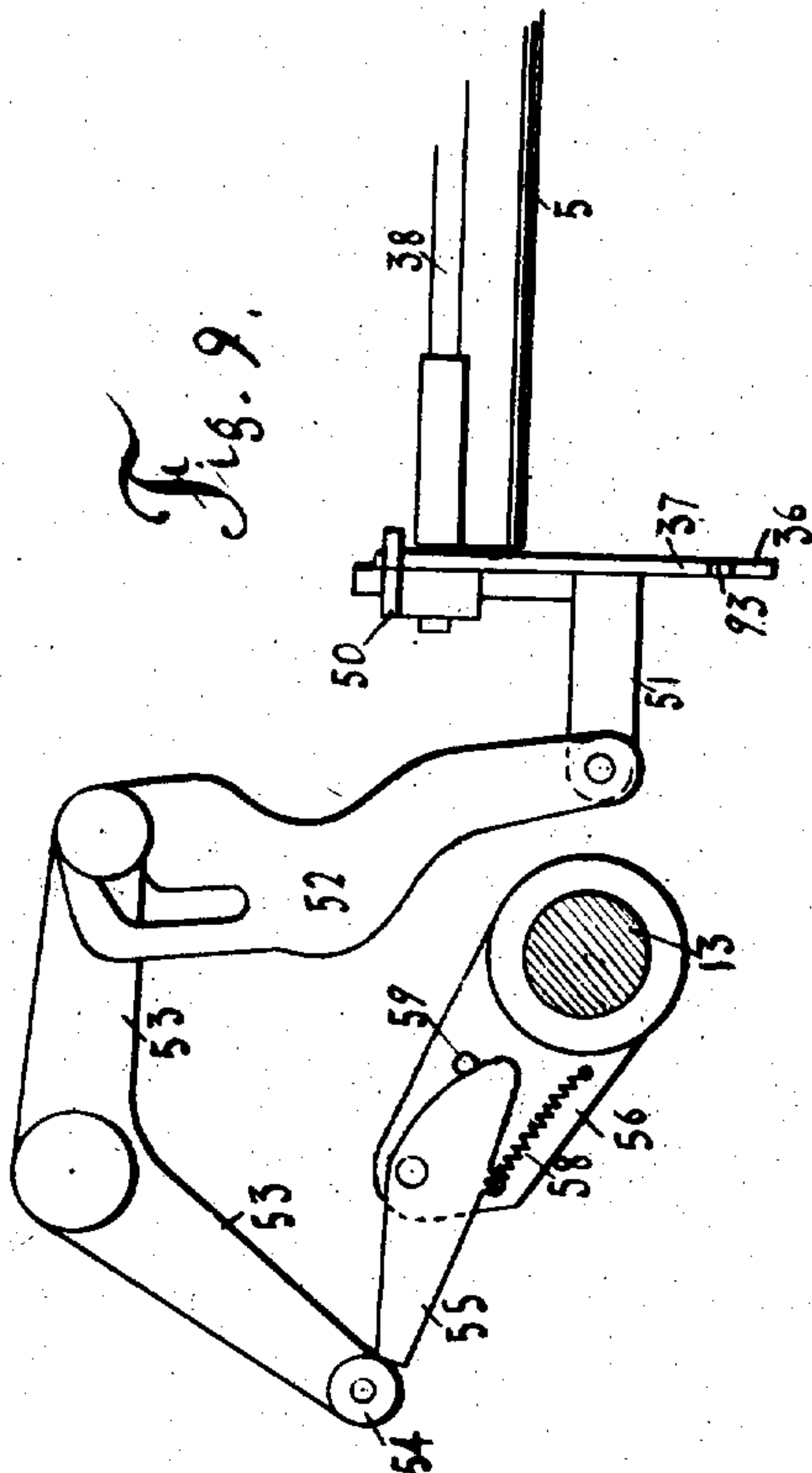
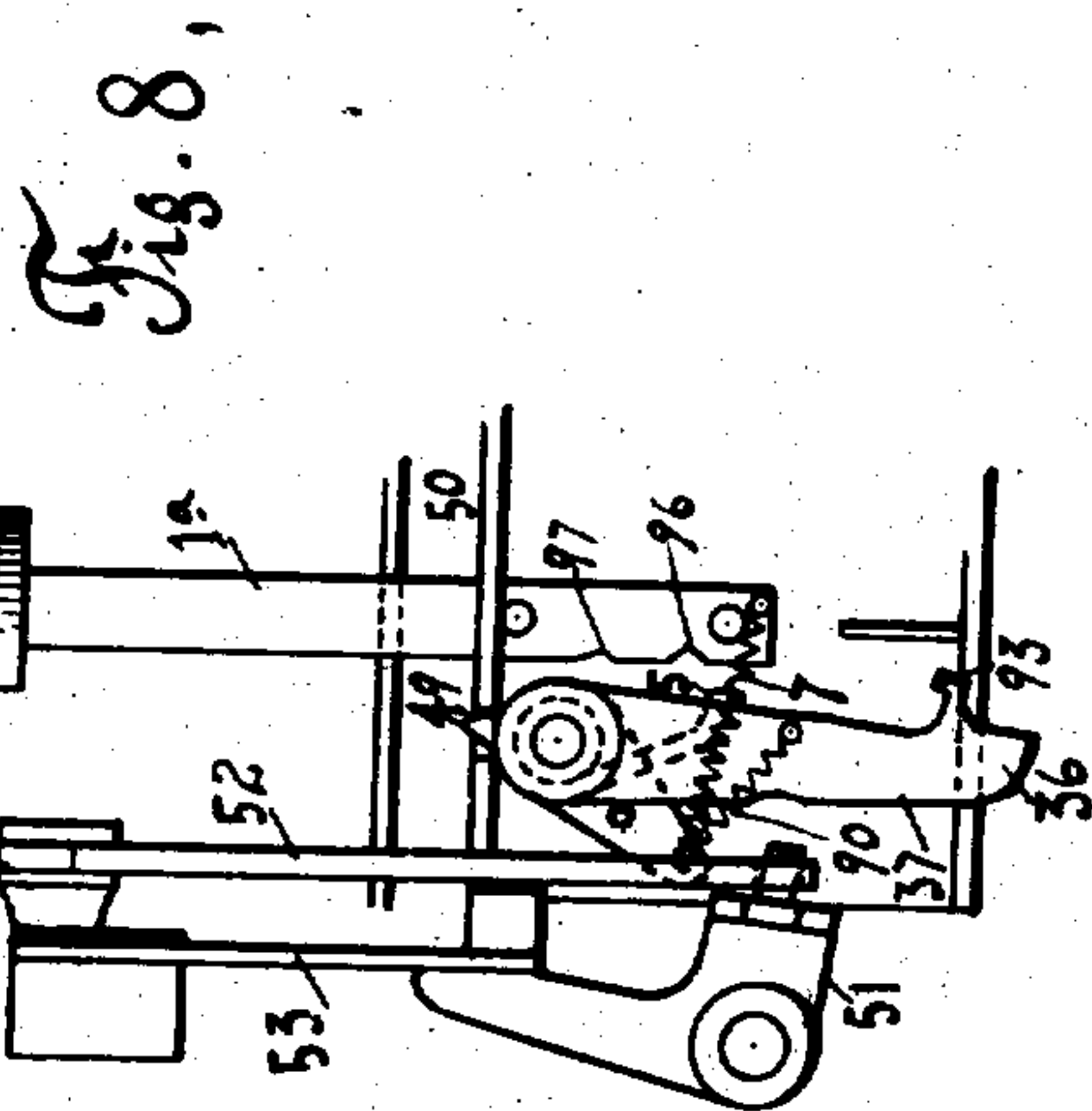
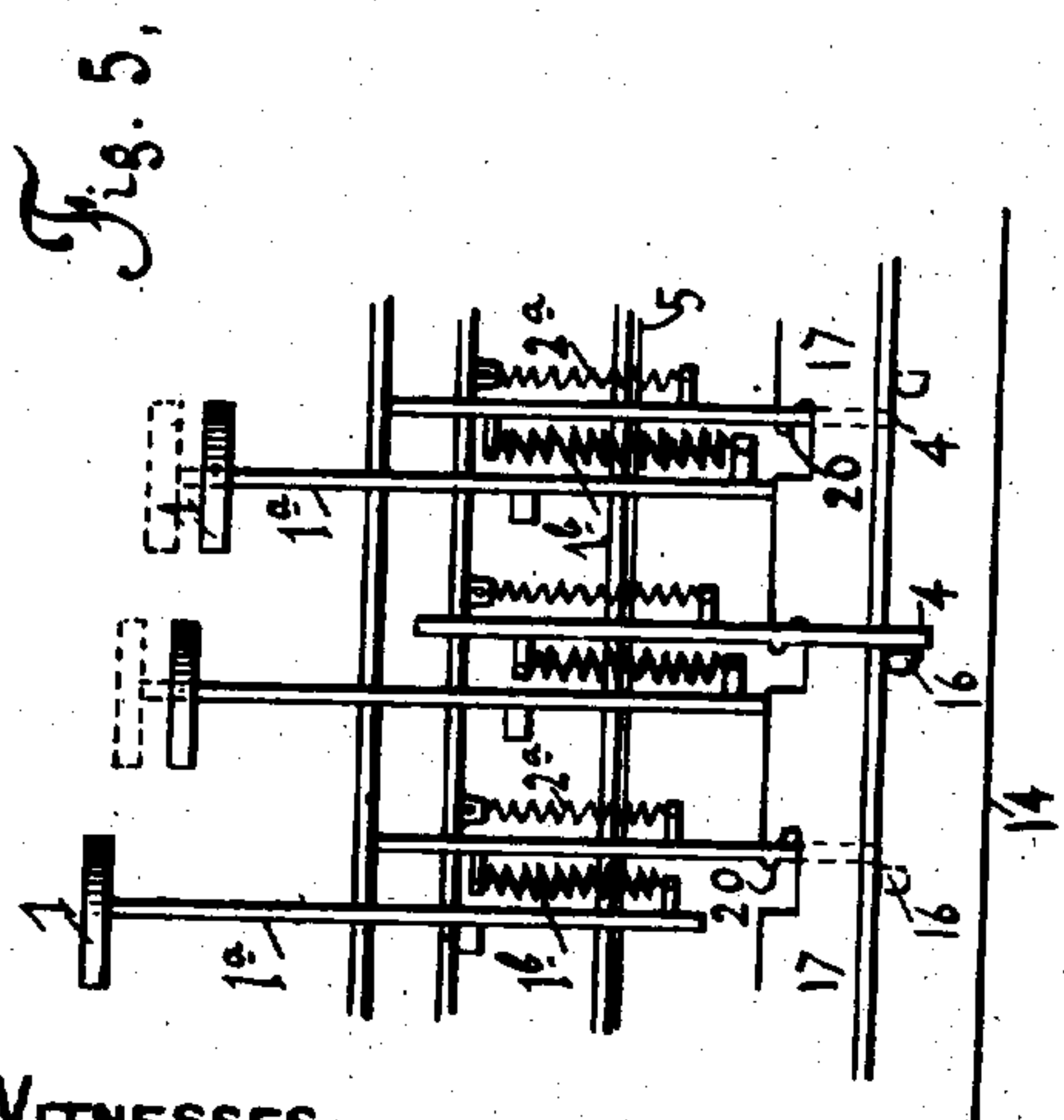
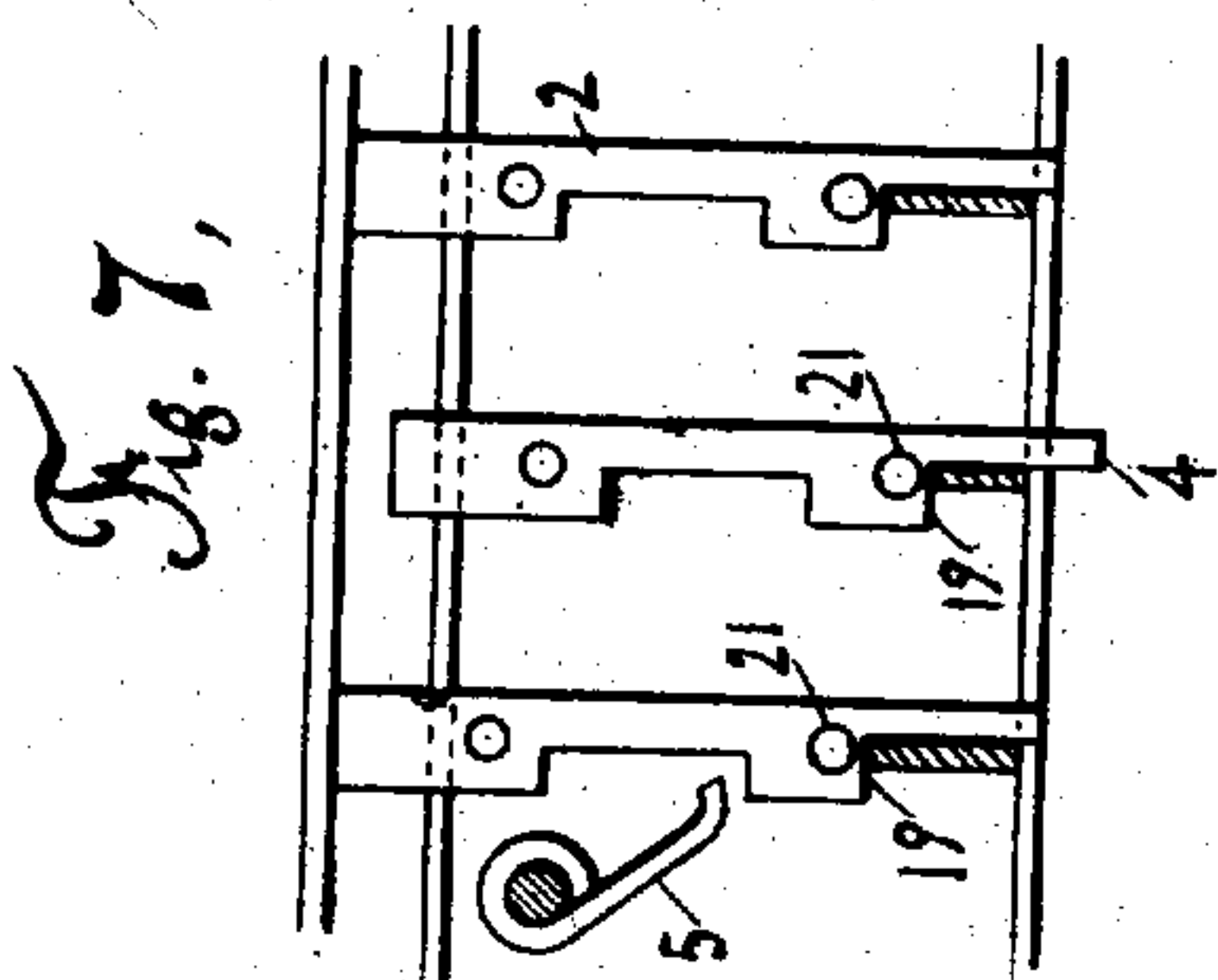
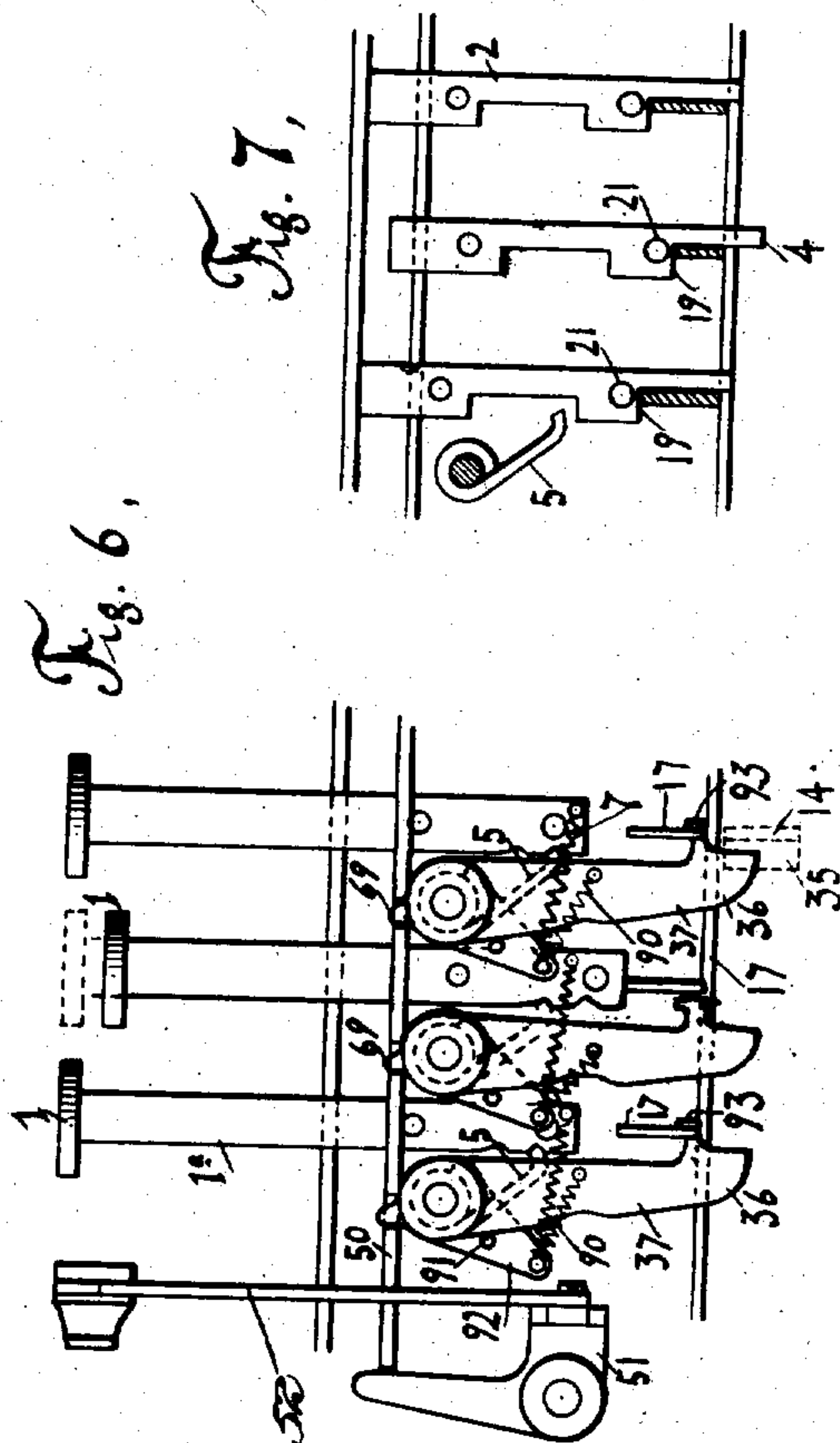
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973,683.

Patented Oct. 25, 1910.

6 SHEETS-SHEET 5.



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By His
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INVENTOR
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UNITED STATES PATENT OFFICE.

WILLIAM H. McFARLAND, OF EAST ORANGE, NEW JERSEY.

COMPUTING AND RECORDING MACHINE.

973,683.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed November 21, 1905. Serial No. 288,500.

To all whom it may concern:

Be it known that I, WILLIAM H. McFARLAND, a citizen of the United States, residing in East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Computing and Recording Machines, of which the following is a specification.

This invention relates to computing machines, and particularly to those in which multiple sets of figure keys are employed and in which means are provided for holding down the keys as they are depressed until the desired number is completed, and for thereupon effecting the adding of said number by means of mechanism driven by electrical, manual or other power; the extent of movement of the various members of the adding mechanism having been determined by said depression of the keys.

The invention is adapted also for machines, which both add and record, or print the numbers selected by the keys. In machines of this character, owing to the many mechanical operations that have to be performed after the setting of the keys before all the parts are restored to their normal positions, a relatively long interval of time elapses after depressing the keys for one number before they can be depressed for the succeeding number, and the operator usually after having turned over the check from which he has just copied finds it necessary to wait for an appreciable interval for the keys to become unlocked, so that he can copy the number or amount from the next check.

In my application filed Oct. 19th, 1905, No. 283,443, means are shown for effecting the resetting or manipulation of the keys after the operation of a power-driven mechanism is begun and before said operation is finished. According to said application, the keys when depressed are held down, but are released preferably during the initial stroke of the power-driven mechanism, and may be reset for the next number during the final or return stroke of the power-driven mechanism. Thus the machine at each operation adds and records the number which was selected by the keys during the preceding operation. The operator is thus enabled to set the keys while the power driven mechanism is performing its functions so that when said mechanism comes to rest it may be set in motion again without any delay to

add and record a new number. Thus much time is saved to the operator; and a skilled operator will be able to keep the power driven mechanism in operation practically without intermission.

The object of my present invention is to simplify and improve the mechanism for said purposes and to simplify the operation, particularly with a view to increasing the speed of operation, and rendering it practicable and inexpensive to introduce the improvement into machines as at present constructed.

In the accompanying drawings, Figures 1 and 2 read together form a sectional elevation taken from front to rear of an adding and recording machine constructed in accordance with my improvements; said machine being generally similar to the well known "Pike" adding machine. In these figures the parts are shown in normal positions. Fig. 3 is a view similar to Fig. 1, but showing the position of the parts at the moment when the type impressions are being made. Fig. 4 is a sectional plan of the lower rear portion of the machine. Fig. 5 is a fragmentary view showing one key with its stop both in normal position, another key with its stop both in depressed or abnormal position, and another key depressed while its stop is locked against depression. Fig. 6 is a rear elevation of several keys with their releasable locking or detaining devices. Fig. 7 illustrates the form and mounting of the stops. Figs. 8 and 9 illustrate the key-releasing operation.

Keys 1 mounted on stems 1^a are held up in normal positions by springs 1^b. Stems 2 formed at their lower ends with stops 4 are held up in normal position by springs 2^a. The stops 4 serve to position the adding and printing or recording devices substantially in the manner shown in patent to W. H. Pike Jr., No. 763,692. When a key is depressed it is held down by means of a latch 5 which springs into a notch 6 formed in the edge of the key stem; said latch being pressed into the notch by a spring 7, (Fig. 6). The keys are mounted in files, one file for each denomination, and each of the latches 5 is in the form of a long strip seen endwise at Fig. 6 and endwise at Fig. 9, so that each latch may lock down any of the keys in its file. Each stem may be provided with two notches to facilitate making corrections as set forth in said patent. The stems 2 carry-

ing the stops 4 are mounted in the same files with the key stems 1^a, each stop being adjacent to its key stem. When a key is depressed, its spring 1^b, which at its lower end is connected to the key stem and at its upper end is connected to the stop stem, serves to carry down the stop stem 2, or in other words to set the stop 4. The movement of the key stem is considerably more than that of the stop stem, and is so great that the tension of the spring 1^b, which is made of relatively heavy wire, is greatly increased during the key stroke. The spring 2^a is made of relatively light wire, and so constructed that its tension varies but little during the setting of the stop. Normally the tension of the spring 1^b is less than the tension of the spring 2^a; but when the former is distended as in the fourth key from the right at Fig. 1, its tension is greater than that of the spring 2^a. The stops 4 are therefore held down by the springs 1^b, the latter being kept distended by reason of the engagement of the latches 5 with the key stems. Hence any keys upon the keyboard may be depressed to set their stops, and the keys will be automatically locked in their depressed positions, and the stops will be held down by the keys.

When the keys for a given number have been depressed and the stops 4 set, a trip 8 seen at the rear of Fig. 1 is lifted by the operator from a recess formed in a disk 9 fixed upon the usual power shaft 10, which by means of a suitable clutch tends constantly to rotate. By means of a single rotation of said shaft the number which has been selected by the keys is both added and recorded and thereupon said shaft is again arrested by the trip 8. A pitman 11 extends from the disk 9 to an operating arm 12 depending from a rock shaft 13 journaled in the sides of the machine frame, so that said shaft is caused to rock first rearwardly and then forwardly during each revolution of the shaft 10. At the initial or rearward rocking of said arm 12 and shaft 13, the operation of the adding and printing mechanism is effected, and at the return movement of said shaft the parts are restored to normal position.

The adding and recording mechanism includes a set of bars or devices 14 one for each denomination lying side by side and extending from front to rear of the machine; these bars 14 being normally in their rearmost positions, but when released being drawn forward by springs 15 to positions determined by the depressed stops 4 on the keys. Each of said adding devices 14 carries a set of stops 16 to engage the stops 4. The depressed key-stops 4 are temporarily bolted down and other stops are locked against depression during the advance movements of said adding bars 14; this result

being effected by means of a series of bolts 17 shown at Fig. 1 in stop releasing positions, and at Fig. 3 in stop-locking positions; each of said bolts having points 20 to slide beneath shoulders 19 formed upon the stop-stems 2 to prevent the latter from descending, and to enter eyes 21 formed in the stop stems to prevent the depressed stops from rising. As soon as the rock shaft 13 begins to turn, said bolts 17 are thrown rearwardly by springs 22 to the stop-bolting positions seen at Fig. 3. Normally said bolts are held forward by a bar 23 supported by depending arms 24; said bar being held in normal position by a pair of cams 25 projecting forwardly and downwardly from the rock shaft 14 and fixed upon the latter. The cams 25 are barely caught upon the rear face of the bar 23 so that at the beginning of the initial movement of said rock shaft 13, the bar 23 and the bolts 17 are released and thrown back to stop-locking positions.

At their rear ends, the adding bars or devices 14 are pivoted to the lower ends of arms 26 depending from a transverse horizontal shaft 27 and rigidly connected to the type carriers 28. The arms 26 are held back by means of a horizontal universal bar 29 upon arms 30 mounted on said shaft 27. This universal bar 29 is controlled by the main power shaft 13; a rearwardly extending cam 31 being fixed upon the latter and engaging a roll 32 provided upon the arms 30. During about the middle portion of the initial movement of said rock shaft 13 said roll 32 rides forwardly along an incline 33 formed upon said cam (being drawn back by springs 34) thus releasing the bars 14 which are drawn forwardly by the springs 15 as far as permitted by the stops 4, the latter being engaged by the stops 16 on the bars 14. Where no stop has been depressed in a file, the bar 14 of that file remains in normal position with a stop 35 resting against a toe 36 formed upon the bottom of an arm or shutter 37 mounted loosely upon the same shaft 38, as the latch 5. During the printing and adding operations, the stops are held down by the points or hooks 20 on the bolt 17; while the undepressed stops are locked against movement by reason of said points 20 lying beneath the shoulders 19 thereon. This locking or bolting operation is effected at the beginning of the initial movement of the rock shaft 13 and before the adding members 14 are released for their forward movements.

Almost simultaneously with the backward movements of the bolt 17, the key stems 1^a are released from the control of the latches 5, this release taking place at the early part of the initial movement of the rock shaft 13, so that the keys may be again set by the operator, while said rock shaft 13 is completing its initial movement and making its

return movement. Said latches are vibrated away from the key stems, Fig. 8 by means of short arms 49 provided upon the rock shafts 38; a universal release bar 50 engaging all of said short arms and being moved toward the right at Fig. 8, by a bell crank 51, so that the keys may be lifted by their springs 1^b. Said bell crank 51 is operated by a link 52 and a bell crank 53, the latter having a roll 54, driven by a trip 55 pivoted upon an arm 56 extending upwardly and rearwardly from the rock shaft 13 and fixed thereon. This trip 55 is seen at Fig. 1 below the roll 54, the latter being in normal position; but as the rock shaft 13 turns, the trip 55 rises and engages said roll and cams the same rearwardly, Fig. 9. During the remainder of the initial stroke of the rock shaft, the trip moves idly to the Fig. 3 position; and during the return movement of the rock shaft, the trip rides idly over the roll 54. The key releasing movement of the bell crank 53 is therefore completed at the early part of the initial stroke of said rock shaft. Said trip is pivoted at 57 upon said arm 56, and is normally held by a spring 58 against a stop 59 upon said arm 56. Thus it will be seen that the keys may be reset by the operator even before the adding members 14 are positioned by the stops 4; thus giving the operator ample time in which to set the keys before the completion of the operation of the power driven mechanism. Hence the work of the operator and the work of the machine may proceed simultaneously, and no interval need elapse between successive operations of the power driven machinery, which may be kept almost constantly in motion.

The printing is effected during the terminal portion of the initial stroke of the main rock shaft 13 by means of an arm 60, Fig. 4, extending back from said shaft and having a wrist 61 engaging a slot 62 formed in the lower end of a link 63. During nearly all of the upward stroke of the arm 60 said wrist travels idly in the slot 62; but finally the wrist reaches the upper end of the slot and lifts the link 63, thereby vibrating a lever 64, Fig. 1, and moving it upon its fulcrum 65 to the Fig. 3 position. As set forth in said patent said lever 64 is one of a pair of levers between which is mounted a series of hooks 66 catching over lips 67 formed on trips 68, whereby said trips are pulled back to the Fig. 3 position, thereby releasing the hammers 69 which strike types 70, and cause them to make impressions upon the paper rolled around the platen 71. At this time the type carriers 28 stand in different positions, corresponding with the positions of the bars 14 which have been arrested by the depressed stops 4; and hence those types are imprinted upon the paper which correspond to the previously depressed keys.

During the final half of the revolution of the shaft 10, the return movement of the rock shaft 13 is effected and the cam 31 acting upon the roll 32 throws back the universal bar 29, thereby restoring the type carriers to normal positions as well as the bars 14, the latter having upon their forward ends racks 72, Fig. 2 to cooperate during their return strokes with pinions 73, to add the number just printed, the result showing upon a series of number wheels 74, as set forth in said patent.

During the final portion of the return stroke of the rock shaft 13, the cam 25 engages the bar 23, and forces it forwardly to the Fig. 1 position, thereby restoring the bolt 17 to normal position. Thus the stops 4 with their stems 2 are released, and returned to normal positions by the springs 2^a. In case however, prior to the unbolting of the stops, any key has been depressed (as at A Fig. 3) which is connected to a previously depressed stop,—such key being of course held down by its latch 5—the spring 1^b of the key serves to retain the stop in its depressed position, so that the stop will be locked or bolted down at the next operation of the power driven mechanism. Thus each key may either set its stop or prevent the previously depressed stop from returning to normal position, as the case may be. Thus it will be seen that the extent of movement of the adding devices 14 is determined by the depression of the keys although the latter have the novel operation of returning to normal positions in advance of the adding devices, means being provided independent of the keys for detaining the adding devices during the restoration of the keys; that the key locks or latches 5 are released as at Fig. 8, while the adding devices 14 are detained in abnormal positions by the springs 15; that said latches 5 constitute releasable means called into operation at the depression of the keys for detaining the latter in their depressed positions, said latches being releasable by the power-driven mechanism; that each complete operation of the power driven mechanism, that is, a single revolution of the shaft 10 or reciprocation of the rock shaft 13, causes the movement away from and back to normal positions of the printing and adding devices, and that means are provided for mechanically effecting the selection during one operation of said power driven mechanism of stops which are to determine the positions of the adding and printing devices at the next operation of said power driven mechanism. The shutters 37 are yieldingly held by springs 90 against stops 91 provided on arms 92, which are rigid with the latch 5. Whenever any key is depressed, the shutter is rocked toward the left at Fig. 6 to release the stop 35 and bar 14. The bolts 17 perform the additional

function of locking the shutters either in or out of normal positions. For this purpose, the shutters are provided with hooks 93, which may pass freely through recesses 94 formed in the rear ends on the bolts. When the latter are moved rearwardly, said hooks catch upon edges of the bolts at 95, and are prevented from being swung to the left at Fig. 6 by the movement of the latch 5 when the key is depressed during the completion of the movement of the power driven mechanism. The yielding connection 90 between the shutter and the arm 92 permits the movement of the key and latch, while the shutter remains stationary. Upon the return of the bolts to normal position at the completion of the operation of the power driven mechanism, said shutter is released and, the spring 90 causes it to swing to the left at Fig. 6, thereby releasing the stop 35 and bar 14 for the subsequent operation of the power driven mechanism.

Each key-stem is provided with a deep notch 96, normally occupied by the latch 5, and also with a shallow notch 97 into which said latch drops when the key is depressed, as shown at the middle of Fig. 6. At this time, the hook 93 stands at the left of the bolt 17, so that when the latter is moved back it serves to lock the shutter against returning to normal position during the completion of the operation of the power driven mechanism. Hence, although both the key and the latch 5 may return to normal positions, still the shutter is locked in abnormal position, so as not to interfere with the return to normal position of its associated adding member 14. After the members 14 are returned to normal positions, the bolts 17 are thrust forwardly to the releasing positions, and the latches may then be swung to the right at Fig. 6 by their springs 7 acting through the arms 92 and stops 91.

Variations may be resorted to within the scope of my invention, and portions of my improvements may be used without others.

Having thus described my invention, I claim:

1. In a computing machine, the combination with a single system of keys, and restoring springs therefor, of stops set by said keys, individual means to hold the stops stationary during the depression of the keys, springs constituting the sole restoring means of said stops, latches to hold said keys down, means for permitting the keys to be returned to normal positions by their springs in advance of said stops, a series of adding devices, and means for moving said adding devices from normal positions to points determined by said stops.

2. In a computing machine, the combination with a single system of keys, and restoring springs therefor, of stops set by said keys, individual means to hold the stops sta-

tionary during the depression of the keys, springs constituting the sole restoring means of said stops, means detaining said keys in depressed positions, means for locking all of said stops in depressed positions, means for releasing the keys in advance of the stops, and adding devices whose strokes are limited by said stops.

3. In a computing machine, the combination with a single system of keys, and restoring springs therefor, of means rendered effective by the depression of said keys, for detaining them in their depressed positions, a series of stops controlled by said keys, individual springs constituting the sole restoring means of said stops, means for detaining said stops in their depressed or set positions and for releasing said keys in advance of the stops, so that the keys may be again depressed while the stops remain depressed, and adding devices whose strokes are limited by said stops.

4. In a computing machine, the combination with a series of adding devices, of a system of stops therefor, individual springs constituting the sole restoring means of said stops, a single system of keys, key-restoring springs, means for enabling the keys to set and retain their associated stops, means called into action by said keys whenever they are depressed, for detaining them in their depressed positions, means for detaining the stops when set and for releasing said keys in advance of the stops, and means for releasing the stops.

5. In a computing machine, the combination with a series of adding devices, of a system of stops therefor, individual springs constituting the sole restoring means of said stops, a single system of keys for setting the stops, key-restoring springs, means for detaining the keys when depressed, independent means for detaining the stops when set and for locking the unset stops, means for releasing the keys, and means for releasing the stops.

6. The combination with a series of adding devices, of a system of stops therefor, individual springs constituting the sole restoring means of said stops, a single system of keys for setting said stops, key-restoring springs, means for detaining the set stops in working positions and the unset stops in normal positions during the return of the keys to normal positions after actuation, and means for returning the adding devices and stops to normal positions after the restoration of the keys.

7. The combination with a series of adding devices, of a system of stops, individual springs constituting the sole restoring means of said stops, a single system of keys for setting said stops, key-restoring springs, means for detaining the set stops in working positions after actuation and the unset stops in

normal positions, and means for returning the adding devices and stops to normal positions after the restoration of the keys; the keys being operable before the return of the adding devices and stops to normal positions, for selecting the stops to be set for the next operation of the adding devices.

8. The combination with a system of adding and printing devices, of power-driven means for operating said system, a single system of keys, key-restoring springs, stops controlled by said keys for determining the extent of movement of said adding and printing devices, individual springs constituting the sole restoring means of said stops, and means for detaining the set stops and said adding and printing devices in operative positions and the unset stops in normal positions, while said keys return to normal positions.

9. The combination with a system of adding and printing devices, of a power-driven mechanism for operating them, a single system of keys, individual springs constituting the sole restoring means of said stops, means enabling said keys to lock themselves in depressed positions, a set of stops operable by the keys, for determining the working positions of said adding and printing devices, means for detaining the set stops in working positions and the unset stops in normal positions, stop-restoring springs, and means controlled by said power-driven mechanism for detaining said stops in working positions and releasing said keys; said keys being depressible during the remaining portion of the operation of said power-driven mechanism, for determining the stops to be set for the next operation of the machine.

10. In a computing machine, the combination with a series of adding devices, of a set of stops, individual springs constituting the sole restoring means of said stops, releasable means for holding the set stops in working positions and the unset stops in normal positions, a single system of self-locking keys, key-restoring springs, and means for enabling each key either to set its stop so that the latter may be locked, or to retain the stop in working position for another operation of the adding devices.

11. In a computing machine, the combination with a series of adding devices, of a set of stops, individual springs constituting the sole restoring means of said stops, releasable means for holding the set stops in working positions and the unset stops in normal positions, a single system of self-locking keys, key-restoring springs, stops for arresting the downward movements of said keys, and means for enabling each key either to set its stop so that the latter may be locked, or to retain the stop in working position for another operation of the adding devices.

12. In a computing machine, the combina-

tion with a series of adding devices and a power-driven mechanism for operating them, of a series of stops, individual springs constituting the sole restoring means of said stops, releasable means for locking the set stops in working positions and the unset stops in normal positions, a single system of keys, key-restoring springs, and means for enabling successive depressions of each key, one depression made before and the other depression made during the operation of the power-driven mechanism, to effect the setting of its stop for successive operations of the power-driven mechanism.

13. In a computing machine, the combination with a series of adding devices, of a series of stops, individual springs constituting the sole restoring means of said stops, releasable means for locking the set stops in working positions and the unset stops in normal positions, a single system of keys, key-restoring springs, releasable means for locking each key as it is depressed, and yielding connections between the keys and the stops.

14. In a computing machine, the combination with a series of adding devices, of a series of stops, individual springs constituting the sole restoring means of said stops, releasable means for locking the set stops in working positions and the unset stops in normal positions, a single system of keys, stops for arresting the depression of the keys, stop-restoring springs, releasable means operated by said keys for locking themselves in working positions, and yielding connections between the keys and the stops, to permit the keys to return to normal positions in advance of the stops, and to enable the keys, upon being redepressed, to prevent the return of the stops to normal positions when released.

15. In a computing machine, the combination with a series of adding devices, of power-driven mechanism for operating them, a series of stops, individual springs constituting the sole restoring means of said stops, means releasable by said power-driven mechanism for locking the set stops in working positions and the unset stops in normal positions, a single system of keys, key-restoring springs, stops for arresting the depression of the keys, key-operated means releasable by the power-driven mechanism in advance of the stops, for locking said keys when depressed, and yielding means between the keys and the stops, for enabling the keys to set the stops and for permitting the keys to return to normal positions in advance of the stops, and for enabling the keys when reset during the operation of the power-driven mechanism, to prevent the return of the previously set stops to normal positions when released.

16. In a computing machine, the combina-

tion with a series of adding devices, of a series of stops movable from normal to working positions, individual springs constituting the sole restoring means of said stops, 5 releasable means for locking the operated stops in working positions and the remaining stops in normal positions, a single system of keys, key-restoring springs, releasable means for detaining the keys in their 10 depressed positions, and means for enabling each key, if operated before the stop locking operation, to set its stop, or, if operated while the stops are locked either to prevent the return of its stop to normal position or 15 to cause its stop, when released, to move from normal to working position.

17. In a computing machine, the combination with a series of adding devices, of power driven means for operating them, a series 20 of stops movable from normal to working positions, individual springs constituting the sole restoring means of said stops, means releasable by said power-driven mechanism for simultaneously locking all of the stops 25 whether in normal or working positions, a single system of keys, key-restoring springs, means releasable by the power-driven mechanism in advance of the release of the stops, for locking said keys when depressed, and 30 yielding means for enabling the keys to set the stops, said yielding means enabling the keys, when depressed before the completion of the operation of the power driven mechanism, either to prevent stops when released 35 from returning to normal positions, or to cause stops when released, to move to working positions.

18. In a computing machine, the combination with a series of adding devices, of a 40 series of stops movable from normal to working positions, means for locking the unset stops in normal positions and the set stops in working positions, individual springs constituting the sole restoring means 45 of said stops, a single system of keys, key-restoring springs, means for enabling said keys to set said stops and to return to normal positions independently of said stops, and releasable means for locking the stops in de- 50 pressed positions.

19. In a computing machine, the combination with a series of adding devices, of a series of stops movable from normal to working 55 positions, individual springs constituting the sole means for returning said stops to normal positions, a single system of keys, springs connecting said keys to said stops, key-restoring springs, releasable means for locking the unset stops in normal positions 60 and the set stops in working positions, and releasable means for locking the keys when depressed.

20. In a computing machine, the combination with a series of adding devices, of power 65 driven means for operating said adding

devices, a series of stops movable from normal positions to positions for arresting said adding devices, individual springs constituting the sole means for returning said stops to normal positions, means 70 operable by the power-driven mechanism for first locking all the set stops in their working positions and all the unset stops in their normal positions and subsequently releasing all the stops, a single system of keys, key- 75 restoring springs, means operated by the keys for locking them in depressed positions, means operated by the power-driven mechanism prior to the release of said stops, for releasing said keys, and springs con- 80 necting the keys to the stops.

21. In a computing machine, the combination with a series of adding devices and means for moving them, of a series of stops therefor, individual springs constituting the 85 sole restoring means of said stops, a single system of keys depressible in advance of the stops, key-restoring springs, means for enabling the stops to be set by the keys subsequently to the depression of the latter, 90 whereby keys may be set during one adding operation for a subsequent adding operation.

22. In a computing machine, the combination with a series of adding and printing 95 devices and power-driven mechanism for operating them, of a series of stops, individual springs constituting the sole restoring means of said stops, a single system of keys for setting the stops, key-restoring springs, means for holding the keys depressed, means for 100 holding the set stops in working positions and the unset stops in normal positions, means controlled by said power-driven mechanism for releasing all the keys simultaneously and subsequently releasing all of 105 the stops simultaneously; said key holding means being again operable independently of the power-driven mechanism upon depression of the keys before the return of the adding devices to normal positions; and 110 each of said keys having means for either setting its stop simultaneously, or preventing the return of its stop to normal position, or causing the stop to move to working position after the depression of the key, so as 115 to be effective at the next operation of the adding and printing devices.

23. In a computing machine, the combination with a series of adding and printing 120 devices, of a power-driven mechanism which at each complete operation causes the movement away from and back to normal position of said adding and printing devices, a system of stops and individual springs constituting the sole restoring means for said 125 stops, a single system of keys, key-restoring springs, yielding connections between said keys and said stops, means for enabling the keys to lock themselves in depressed positions, means operated by said power-driven 130

mechanism at the initial portion of its movement for locking the stops in both working and normal positions, means operated by said power-driven mechanism at the locking of said stops, for releasing said keys, and means for subsequently releasing the stops.

24. In a computing machine, the combination with a series of adding and printing devices, of a power-driven mechanism which at each cycle of operations causes the movement away from and back to normal positions of said adding devices, a series of stops for determining the extent of movement of said adding and printing devices, individual springs constituting the sole restoring means of said stops, a single system of keys, key-restoring springs, yielding connections between the keys and said stops, means for enabling the keys to lock themselves in depressed positions, means operated by said power-driven mechanism at the initial portion of its movement for locking the stops in both working and normal positions, means operated by said power driven mechanism immediately after the locking of said stops and during the movement of said adding devices toward said stops, for releasing said keys, so that the keys may be again operated during the remainder of the cycle of operations of the power-driven mechanism, and means operated by the latter for subsequently releasing the stops.

25. In a computing machine, the combination with a series of adding devices, of a power driven mechanism for operating said adding devices, a series of stops, stop-restoring springs a single system of keys for setting said stops, key-restoring springs releasable bolts for locking said stops, locks for said keys; said key locks being releasable by said power driven mechanism in advance of the release of said stops; and stops upon said adding devices for cooperation with said key stops.

26. In a computing machine, the combination with a series of adding devices, of a power driven mechanism for operating said adding devices, a series of depressible stops, stop-restoring springs a single system of keys having stems adjoining said stops, key restoring springs yielding means transmitting movement from the keys to the stops, releasable means for locking said stops, locks for said keys; the keys being releasable by the power driven mechanism in advance of the release of said stops; and stops upon said adding devices for engaging said stops.

27. In a computing machine, the combination of a single system of keys and stems upon which the keys are mounted, key restoring springs a series of adding devices, a power driven mechanism for operating said adding devices, a series of stems each adjoining a key stem and having a stop, means for guiding the key stems and stop stems,

springs for returning the stop stems, springs between the latter and the key stems, latches operable by the key stems for holding them in depressed positions, bolts for the stop stems, the latter so formed that the bolts may lock them in both normal and depressed positions, and means controlled by the power driven mechanism for moving the bolts to working positions, releasing the key latches and advancing the adding devices until arrested by the depressed stops and permitting the key latches to resume their normal functions, and returning the adding devices of the bolts to normal positions.

28. In a computing machine, the combination with a series of adding and printing devices, of a power driven mechanism including a main shaft, a single system of keys, restoring springs therefor, latches for holding said keys depressed, a set of stops, stop-restoring springs a set of bolts for locking the stops in both normal and abnormal positions, means operated at the beginning of the movement of said shaft for moving said bolts to operative positions and for releasing said keys and advancing said adding and printing devices until arrested by said stops, provision being made for immediately restoring the function of said key latches so that the keys may be again operated and thereupon detained by said latches, and for restoring said adding and printing devices and said bolts to normal positions, means operating between said keys and stops for enabling the former to set the latter either simultaneously and before the operation of said bolts, or subsequently to the operation of the keys and after the reciprocation of said bolts to normal positions.

29. In a computing machine, the combination with a series of adding and printing devices, of a power driven rock shaft, a set of keys, latches for holding said keys depressed, a set of stops, springs for returning said stops to normal positions, springs between said keys and said stops, a set of bolts for locking the stops in both normal and abnormal positions, means for rocking said rock shaft, means rendered operative at the beginning of the initial movement of said rock shaft for throwing said bolts into effective positions, a trip connected to said rock shaft, means operated by said trip at the beginning of the initial movement of said rock shaft for releasing said keys; said trip being constructed to release said key releasing means immediately after releasing the keys, and to return idly to normal position at the return stroke of said rock shaft, and means operated upon the return stroke of said rock shaft for returning said adding and printing devices and said bolts to normal positions.

30. In a computing machine, the combination with a series of adding devices, of

springs for moving them from normal positions, shutters normally restraining said adding devices against movement by said springs, a series of stops, a series of keys, bolts for said stops, latches for said keys, a power driven mechanism, means controlled by the latter for both operating and releasing said bolts and for releasing the latches in advance of the bolts, means controlled by said keys for moving said shutters to inoperative positions, and means for enabling said bolts when operated to lock in both normal and abnormal positions both said stops and said shutters.

31. In a computing machine, the combination with a series of adding devices, of springs for moving them from normal positions, shutters normally restraining said adding devices against movement by said springs, a series of stops, a series of keys, bolts for said stops, latches for said keys, a power driven mechanism, means controlled by the latter for both operating and releasing said bolts and for releasing the latches in advance of the bolts, means controlled by said keys for moving said shutters to inoperative positions, and means for enabling said bolts when operated to lock in both normal and abnormal positions both said stops and said shutters; yielding connections being provided between the keys and the shutters, such that when said bolts are released, said shutters may be moved by said connections to inoperative positions.

32. In a computing machine, the combination with a series of adding devices, of

shutters for restraining said adding devices against movement, a series of keys, means for enabling the keys to release the shutters, means for causing the keys to return to normal positions, a series of stops, yielding connections between the keys and the stops, means for locking the stops in both working and normal positions and for releasing the stops subsequently to the release of the keys, stops upon said adding devices to cooperate with said key operated stops, and means for preventing release of the shutter by the keys while the stops are locked.

33. In a computing machine, the combination with a series of adding devices, of springs for moving said adding devices, shutters for restraining said adding devices against movement, a series of keys, means for enabling the keys to release the shutters, means for causing the keys to return to normal positions, a series of stops, yielding connections between the keys and the stops, means for locking the stops in both working and normal positions and for releasing the stops subsequently to the release of the keys, stops upon said adding devices to cooperate with said key operated stops, and means for preventing release of the shutter by the keys while the stops are locked; yielding connections being provided between said keys and said shutters, so that the latter are operated by the depressed keys, subsequently to the release of the stops.

W. H. McFARLAND.

Witnesses:

B. C. STICKNEY,
 KITTIE FRANKFORT.